PATENT
0425-0846P

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant:	MATSUOKA et al.	Conf.:	9781
Appl. No.:	09/942,798	Group:	3641
Filed:	August 31, 2001	Examiner:	P. NELSON
For:	GAS GENERANT COMPOSITION		

DECLARATION UNDER 37 CFR 1.132

Honorable Commissioner of Patents
and Trademarks
Washington, D.C. 20231

Sir:

I, Shogo Tomiyama, declare the following.

I am fully knowledgeable of the disclosure of the above-identified application and the field of art of the present invention. I have read and understand the Office Action dated August 5, 2002 and the references cited therein, Ramaswamy et al. (US 5,661,261), Yoshida (US 5,898,126), and Butt et al. (US 5,659,150).

The present invention relates to a gas generant composition containing manganese dioxide particles having a specific surface area of not less than 50 m^2/g. In view of this specific surface area range of the manganese dioxide particles, the inventive gas generant composition has

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superior properties to compositions that do not contain manganese dioxide within this range.

In the August 5, 2002 Office Action, the Examiner cites Ramaswamy et al. for teaching that manganese dioxide particles of 2-5 microns can be used in the gas generant composition at column 4, line 7. The Examiner has taken the position that the manganese dioxide particles of Ramaswamy et al. *inherently* have a specific surface area of at least 50 m^2/g, as presently claimed.

I have determined that the manganese dioxide particles of Ramaswamy et al. do not inherently have a specific surface area of at least 50 m^2/g based on the following considerations.

The relationship between particle size and specific surface area

There is a relationship between particle size and specific surface area. When the particle size (diameter) is R, the surface area S and volume V are calculated as follows.

$$S = 3.14 \times R^2$$
$$V = 1/6 \times 3.14 \times R^3$$

Since the density of MnO_2 is 5.026 (g/cm^3), the number n of particles included in 1.0 g of MnO_2 is calculated as follows:

$n = 1/(5.026 \times 10^6 \times V) = 6/(5.026 \times 10^5 \times 3.14 \times R^3)$.

So the specific surface area is:

$n \times S = 6/(5.026 \times 10^6 \times R)$.

When R is 2 to 5 micrometers, the specific surface area range is calculated as 0.24 to 0.60 (m^2/g) as follows:

R = 2 micrometer, $6/(5.026 \times 10^6 \times R) = 6/(5.026 \times 10^6 \times 2 \times 10^{-6}) = 0.60(m^2/g)$, and

R = 5 micrometer, $6/(5.026 \times 10^6 \times R) = 6/(5.026 \times 10^6 \times 5 \times 10^{-6}) = 0.24(m^2/g)$.

As evidenced by the calculation above, if the particle has no fine pores or no agglomeration, it only has a specific surface area less than $1(m^2/g)$. That is, it is normal for particles to have such a small specific surface area.

Thus, since there is no description of fine pores or agglomeration in Ramaswamy et al., it is NOT believed that the MnO_2 particles have a specific surface area not less than 50 m^2/g, as presently claimed.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such

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willful false statements may jeopardize the validity of the application or any patent issued thereon.

Shogo Tomiyama   January 31, 2003

Signature   Date